The Minimum Wage Economy, Variable Returns to Scale and Welfare**

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I. Introduction

Ever since the pioneering articles by Batra [1968], Jones [1968], Kemp and Negishi [1970] and Herberg and Kemp [1969], several trade theorists have analyzed the welfare implications of international trade in the presence of variable returns to scale. The contributions by Eaton and Panagariya [1979], Panagariya [1980, 1981], Choi and Yu [1984a, 1984b, 1985] explore some positive as well as normative aspects of trade theory under variable returns to scale. By comparison, absolutely no attempt has been made to analyze the welfare effects of trade intervention in the presence of generalized unemployment and variable returns to scale. In one sense, the problem, being considered here is important because the majority of trading countries, developed as well as developing economies, have suffered from chronic unemployment throughout this century. In a seminal article Brecher [1974a, 1974b] imposed a minimum real wage rate in the economy and analyzed some trade proposition in the presence of generalized unemployment. However, Brecher's model has the properties of the single factor Ricardoian model of trade and leads a trading country to complete specialization. In order to avoid complete specialization and production indeterminancy, a two-sector, three factor general equilibrium framework is set up to analyze the welfare implications of some protection measures by allowing the presence of variable returns to scale (henceforth VRS) and unemployment.¹

In the next section, the model is presented. Section III deals with transformation curve and unemployment under VRS. In section IV, terms of trade and welfare as well

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** I wish to thank an anonymous referee for valuable comments on an earlier version of this paper.
¹ The model adopted in this paper was first developed by Batra and Beladi (1988).
as the welfare consequences of some protection measures are analyzed. Finally, section V offers some concluding remarks.

II. Assumptions and the Model

Consider an economy consisting of two sectors, X (manufacturing) and Y (agricultural) where X uses capital and labor whereas Y uses capital, labor and land. The production side of our model is described by the following functions:

\[ x = g_x(X) F_x(c_x, l_x) \]  
\[ X = g_x(X) F_x(K_x, L_x) \]  
\[ y = g_y(Y) F_y(c_y, l_y, \bar{v}) \]  
\[ Y = g_y(Y) F_y(K_y, L_y, \bar{V}) \]

Where \( x \) and \( y \) are the output of a typical firm in manufacturing and agricultural sectors respectively; \( c_i \) and \( l_i \) are capital and labor employed by the firm in industry \( i \) \((i=x, y)\): \( X \) and \( Y \) are the total output in each sector; \( K_i \) and \( L_i \) are the total capital and labor employment in the \( i \)th sector; \( \bar{v} \) is land employed by a typical firm in the agricultural sector whereas \( \bar{V} \) is the total land used in that sector. \( g_x \) and \( g_y \) reflect the extent of externality and are positive function defined on \([0, \infty]\). Following Kemp [1969], Batra [1973] and others, we assume that production function for a typical firm is subject to external economies or diseconomies and \( F_x \) and \( F_y \) are linearly homogeneous with positive but diminishing marginal productivities of each input. We also assume that the economies of scale are output generated and are external to the firm, but internal to the industry. Let \( \varepsilon_x \) and \( \varepsilon_y \) be the output elasticity of returns to scale of the \( i \)th industry which is defined on \([0, 1]\) and can be written as:

\[ \varepsilon_x = \frac{(dg_x/dX)F_x}{(dg_x/dX) (X/g_x)} \]  
\[ \varepsilon_y = \frac{(dg_y/dY)F_y}{(dg_y/dY) (Y/g_y)} \]

Where \( \varepsilon_i = 0 \) \((i=x, y)\) indicates constant returns to scale (CRS) industry, \( \varepsilon_i > 0 \) reflects increasing returns to scale (IRS) industry and \( \varepsilon_i < 0 \) implies decreasing returns to scale (DRS) industry. Total differentiation of (1) and (2) yield,

\[ (1-\varepsilon_x)dx = g_x(F_{xx} dK_x + F_{xL} dL_x) \]  
\[ (1-\varepsilon_y)dy = g_y(F_{yK} + F_{yL} dL_y + F_{yV} dV) \]

where \( F_{xx}, F_{xL} \) and \( F_{yK} \) are the partial derivative of \( F_i \) with respect to capital, labor and